APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/538,398	03/29/2000	Eiji Sawa	0039-7669-2S	6438

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EXAMINER
PATEL, SHEFALI D

ART UNIT	PAPER NUMBER
2621	

DATE MAILED: 06/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 07-01)

Office Action Summary

Application No.	Applicant(s)
09/538,398	SAWA ET AL.
Examiner	**Art Unit**
Shefali d Patel	2621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 April 2003* .

2a)☐ This action is **FINAL.**   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle,* 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,7-11,14-18 and 21-31* is/are rejected.

7)☒ Claim(s) *6,13 and 20* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☒ The proposed drawing correction filed on *15 April 2003* is: a)☒ approved b)☐ disapproved by the Examiner.

    If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☒ All b)☐ Some * c)☐ None of:

       1.☒ Certified copies of the priority documents have been received.

       2.☐ Certified copies of the priority documents have been received in Application No. _____ .

       3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

    a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .

4)☐ Interview Summary (PTO-413) Paper No(s). _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: .

DETAILED ACTION

Response to Amendment

1. This action is in response to the amendment filled on April 15, 2003.

2. The drawing corrections have been approved.

3. The changes in the specification and in an abstract have been made.

Response to Arguments

1.   Applicant's arguments, filed on April 15, 2003, with respect to the IBM Technical

Disclosure Bulletin have been fully considered and are persuasive. Therefore, the rejection

based on the IBM Technical Disclosure Bulletin has been withdrawn. However, upon further

consideration, and a newly uncovered reference to Schott, a new ground(s) of rejection is made.

Claim Rejections - 35 USC § 103

2.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

3.   Claims 1-4, 8-11 and 21-30 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Bunn in combination with Schott (USPN 5,850,466).

With regards to **claim 1** which is representative of **claim 8**, Bunn discloses a pattern

inspection method and a device which acquires difference data by subtracting a real pattern

window having real pattern data corresponding to predetermined pixels of the real pattern data

obtained by imaging an inspection object from a design pattern window corresponding to the real

pattern window and shift design pattern windows which are obtained by shifting the design

pattern windows in a plurality of directions. Bunn discloses a data of a reference image (X x Y)

at column 6 lines 3-5 while the shift design pattern window (M x N) is at column 6 lines 27-29.

By comparing (column 6 lines 34-44) these two arrays (i.e., windows) Bunn finds the difference

data (column 8 lines 40-42). Bunn discloses selecting one window from the design pattern

window and shift pattern windows such that the selected one window has a minimum difference

data at column 7 lines 26-31. Bunn also discloses performing a pattern inspection of the

inspection object based on a difference value between the selected one window and the real

pattern window at column 7 lines 35-45. Note that the "M x N sub array is selected to be larger

than the X x Y sub array in both dimensions to permit a search for a best match at many possible

locations" (see Bunn: column 6, line 40-43). Thus the arrays are shifted relative to one another

as required in the claims. Bunn dos not expressly disclose the shift width of the shifted design

pattern windows being within one pixel. Schott discloses shifting the designed pattern window

within one pixel at column 5 lines 46-55. At the time the invention was made, it would have

been obvious to a person of ordinary skill in the art to have the shift width of the design pattern

windows within one pixel to improve an inspection precision by eliminating errors as suggested

by Schott at column 5 lines 51-52.

With regards to claim 2 which is representative of claim 9, Bunn discloses a method and

a device wherein the acquiring step, selecting step and performing step are repeatedly executed

with respect to all pixels of the real pattern data as seen in Figures 4a-4d and also at column 6

line 48-51.

With regards to **claim 3** which is representative of **claim 10,** Bunn discloses a method and a device where the plurality of directions are eight directions of 0°, 45° (Figure 4b), 90°, 135° (Figure 4a), 180°, 225° (Figure 4c), 270°, 315° (Figure 4d) with respect to a noticed pixel of said real pattern window at column 7 lines 61-66. (Note that the windows 60, 62, 64, and 66 is being shifted respect to the dotted square which is the original (i.e., real) X x Y window). Keep in mind that Bunn discloses all the eight direction. By shifting the windows 52, 54, 56 and 58 (as shown in Figs. 4a-4d) 0°, 90°, 180°, and 270° are covered.

With regards to **claim 4** which is representative of **claim 11,** Bunn discloses a performing step comprising selecting a central pixel of the selected one window (column 7 lines 51-55) obtaining a difference value between the selected central pixel and a central pixel of the window of said real pattern data (column 7 lines 55-61, note that by comparing two images and finding the difference between the two (error), Bunn finds the difference value) and determining a defect of the inspection object by comparing the obtained difference value between the selected central pixel of the selected one window and a threshold value set in advance (column 8 lines 28-34).

With regards to **claim 21** which is representative of **claim 25 and 29-30,** Bunn discloses a pattern inspection apparatus comprising: an image device to which an image of an inspection object is input and from which an inspection pattern data of the input image is output, which is digitized for each of pixels at column 4 lines 27-29; a memory storing the inspection pattern data output from the image device at column 4 lines 51-54; means for extracting an inspection pattern (i.e., referred as "real pattern" in claim 1) data window with a noticed pixel located at a center (column 7 line 51-55, note: the center of the sub-array is used as the noticed pixel for

correlation), from the inspection pattern data sorted to inspect a part of the inspection object at

((X x Y), column 6 lines 3-5); means for extracting a non-defective (i.e., referred as "shift design

pattern windows" in claim 1 and "design pattern" in claim 25) pattern data window with the

noticed pixel located at the center, from a non-defective pattern data ((M x N), at column 6 lines

27-29); means for comparing the extracted inspection pattern data window with the generated

non-defective pattern data window, thereby inspecting the part of the inspection object at column

6 lines 34-44. Bunn dos not expressly disclose a non-defective pattern data window located at a

position that is shifted from the noticed pixel by a width smaller than one pixel. Schott discloses

a non-defective pattern data window located at a position that is shifted from the noticed pixel by

a width smaller than one pixel at column 5 lines 46-55. At the time the invention was made, it

would have been obvious to a person of ordinary skill in the art to have the shift width of the

design pattern windows within one pixel to improve an inspection precision by eliminating errors

as suggested by Schott at column 5 lines 51-52.

With regards to **claim 22**, which is representative of **claim 26**, Bunn discloses means for

comparing as described above. It is obvious that means for comparing is also used to compare

the inspection pattern with the non-defective pattern data window as disclosed at column 6 lines

34-44.

With regards to **claim 23**, which is representative of **claim 27**, Bunn discloses obtaining

difference value as mentioned in claim 1 and therefore determining a defect of the inspection

object by comparison as disclosed at column 6 lines 34-44.

4.   Claims 7, 14, 24 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Bunn in combination with Schott as applied to claims 1 and 8 above, and further in view of

Masaki (USPN 4,547,800).

With regards to **claim 7,** which is representative of **claims 14, 24 and 28,** Bunn discloses

all the elements recited in claim 1. Bunn does not disclose determining the difference value

based on lightness of pixels between the real and design pattern data. Masaki discloses a method

and a device for position detection where the difference value is determined by correlating two

images (i.e., real and design) at column 9 lines 9-20. At the time the invention was made, it

would have been obvious to a person of ordinary skill in the art to find the difference value based

on the lightness (or, darkness) of pixels since the illumination is necessary in inspecting a defect

or a pattern.

5.   Claims 15-18 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Bunn in combination with Schott, and further in view of Scepanovic et al. (USPN 6,175,953).

With regards to **claim** 15, which is representative of **claim 31** Scepanovic et al. discloses

a substrate with a light shielding film on which a mask pattern is formed and inspecting a

substrate with the light shielding film on which a mask pattern is formed at column 2 lines 18-31.

Scepanovic et al. further teaches at column 10 lines 66-67 and column 11 lines 1-9 of relating his

invention to machine-readable media and manufacturing. Thus disclosing the method of

manufacturing a mask.

Scepanovic et al. does not expressly disclose the inspecting steps in claim 15 lines 23-27

of page 47 and lines 1-10 of page 48.

The recited features of the inspecting step (claim 15 lines 23-27 of page 47 and lines 1-10 of page 48) are the same as those in claim 1 as to the relevance of Bunn and Schott are incorporated herein.

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to apply the image processing method (i.e., inspection) of Bunn in Scepanovic et al.'s invention for immunity of distortion and misregistration of images.

With regards to **claims 16-18**, the recited features are the same as those in claims 2-4, and the arguments in paragraph 3 above as to the relevance of Bunn are incorporated herein.

Allowable Subject Matter

6.   Claims 6, 13 and 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

7.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.
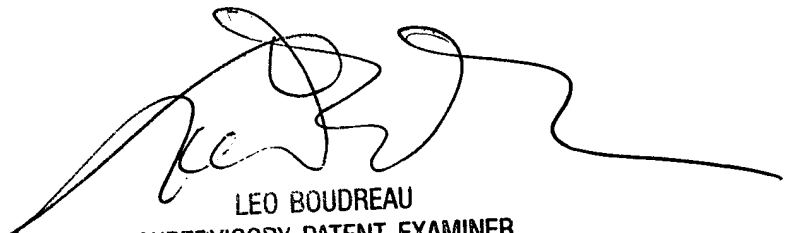
USPN 4,853,968 – Pattern recognition apparatus and method, see column 5 lines 61-68 and column 6 lines 55-65, Figs. 3-5.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shefali d Patel whose telephone number is 703-306-4182. The examiner can normally be reached on M-F 8:30am - 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Leo H Boudreau can be reached on 703-305-4706. The fax phone numbers for the

organization where this application or proceeding is assigned are 703-872-9314 for regular

communications and 703-872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding

should be directed to the receptionist whose telephone number is 703-306-0377.

Shefali Patel
June 2, 2003

LEO BOUDREAU
SUPERVISORY PATENT EXAMINER
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